

# Microsoft® Tablet PC Overview

**Alex Loeb**

General Manager

Tablet PC

Microsoft Corporation

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# What Is The MS Tablet PC?

- **A fully functional PC**
  - Supersets capabilities of the laptop
- **Runs Windows XP Pro 'plus'**
  - The ability to drive Windows with a pen
  - Supports all legacy Windows applications
- **Enables powerful new Windows applications**
  - Editing and note taking, especially in meetings
  - Cut and paste, insert, edit, format, attach to e-mail
  - Search handwritten notes for keywords
  - Improved ink mark-up, "Ink as ink"
  - The best reader available

*Tablet PC is an evolution of the laptop*

# Why A Tablet PC?

Go where no PC has gone before

- **Meetings**

- Laptops sub-optimal; can be distracting and rude
- Can't easily capture all information

- **Reading**

- Electronic books
- Read immersively and actively

- **Working away from a desk**

*Tablet PC extends PC usage*

# How Do We Get There?

- **More adaptable, ergonomic form factor**
  - Slate-like device, similar to a pad of paper
  - Light, great screen, holds well
- **Expand input mechanisms**
  - Voice, pen, navigation buttons, keyboard or mouse
  - There will be "convertible" Tablets with keyboards
- **Great software**
  - Full legacy Windows® application support
  - System level enhancements
  - Applications for key scenarios

*Combine simplicity of paper with power of a PC*



# Why Now?

- **Technology improvements**
  - Low power, high performance CPUs
  - Large, fast, low-power memory
  - Low power LCDs
  - Efficient batteries
  - Wireless network infrastructure
  - ClearType
  - Advances in handwriting and speech recognition
  - New UI for Pen input and easy navigation

*The technology is finally ready!*

# Who Will Use It?

- **All PC owners, eventually**
  - Tablet are the evolution of the laptop
  - Active pen will become as ubiquitous as the mouse
- **Low hanging fruit: corporate workers**
  - Spend significant time away from desk
  - In formal or informal meetings
  - Accessing local files and applications
  - Wirelessly accessing e-mail, network resources
- **OEM and ISV support will enhance and expand focus**

*Tablet PC is great for business*

# Tablet PC Team Deliverables

- **Hardware support**
  - Prototypes for proof of concept
  - OEM Support
- **System components**
  - Windows XP enhancements
  - Speech and handwriting TIP
- **Notebook Application**
- **Platform Components**
  - Platform SDK, APIs, design guidelines



# Hardware Support

- Prototypes

- Proof of concept
- Partner excitement
- User interaction testing

- OEM support

- Traditional OAK, etc
- Design form factor testing and feedback

# Hardware challenges

- Microphone, signal processing
- Screen readability
- Pen & digitizer technologies
- Form factor ergonomics
- More...

# System Components

- All platform work for Pen, Ink, Speech
- System optimization - display, form factor, etc.
- Natural Input UI (TIP), combination of speech, handwriting, soft keyboard
- Handwriting/language recognition
  - US English, International English, Japanese, German, French (V1)
  - Simplified and Traditional Chinese, Korean
  - Future - Spanish, Italian

# System Challenges

- Network connectivity
- Hot docking and undocking
- Parallax tolerance
- Portrait orientation UI issues
- More...

# Notebook Application

## Objectives

- Delight customers in key scenarios
  - Taking notes with a pen
  - Using Windows/PC in meeting
  - Reading and marking up documents

The Notebook App is a powerful tool for taking notes, reading documents, and marking up documents. It is designed to be used in meetings and on the go.

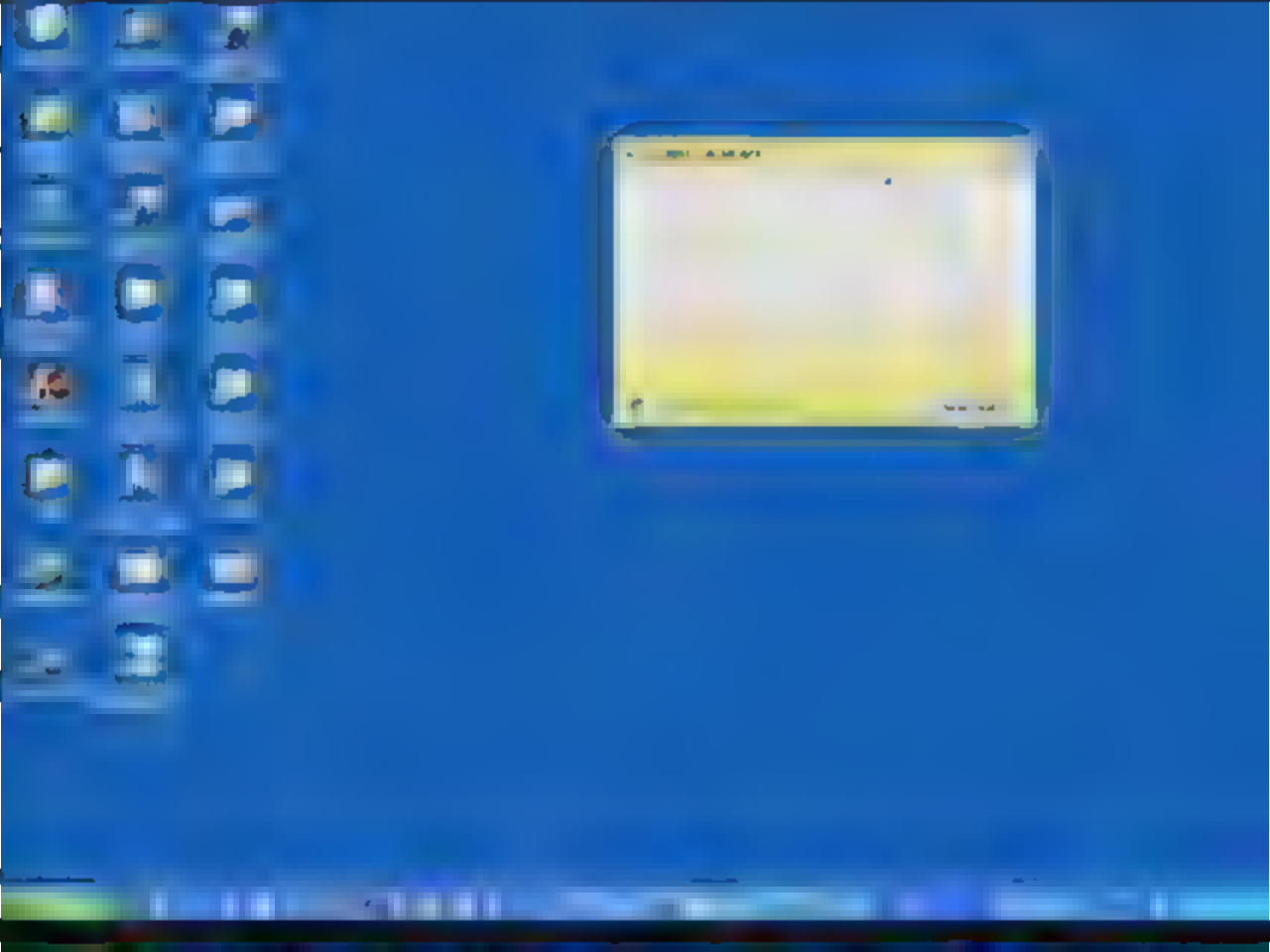


# Notebook Application

- **Key needed functionality**
  - Replacement for pen and paper
  - Markup electronic print out from any app
- **Showcase application for ISVs**
  - Paper-like, pen-centric UI optimized for note taking
- **Consumer of our ISV deliverables**
  - High quality ink rendering, parsing and manipulation
- **Other Applications**
  - MODVEpaper
  - Sticky notes
  - MS Reader, etc

# Applications challenges

- Interface for Connected Components
- Picture Extraction
- Extracting Vector Graphics
- Layout Analysis
- Ink rendering and display
- More...




The New York Times

[illegible]
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the other way around either.

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**See also** Defences; see also *Tests*; *Key*; *Signal*

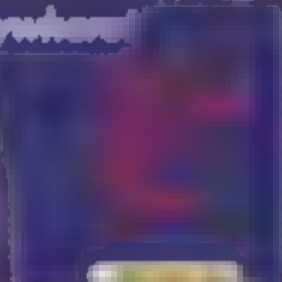
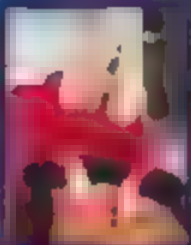
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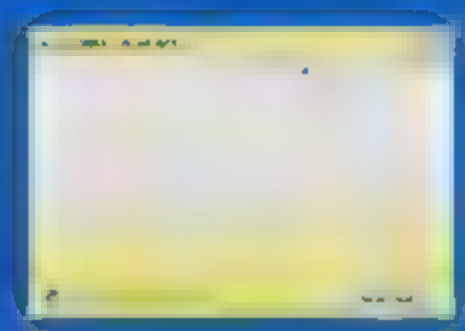
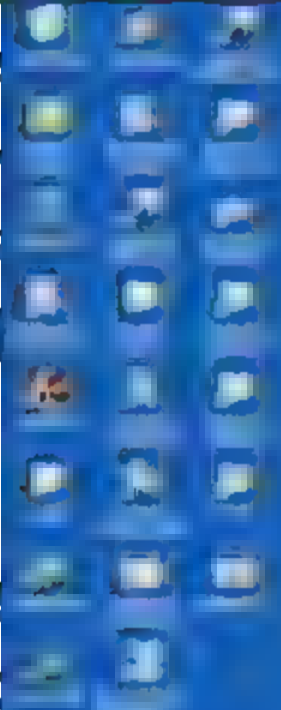
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# Tiny Wireless Video Camera

File anywhere!





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[illegible]

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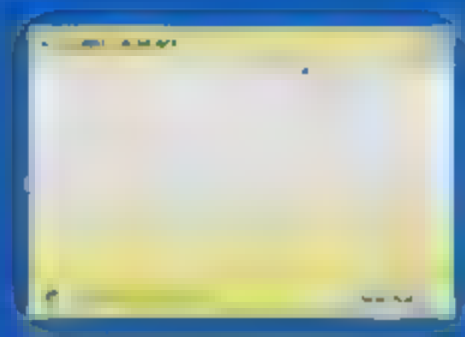
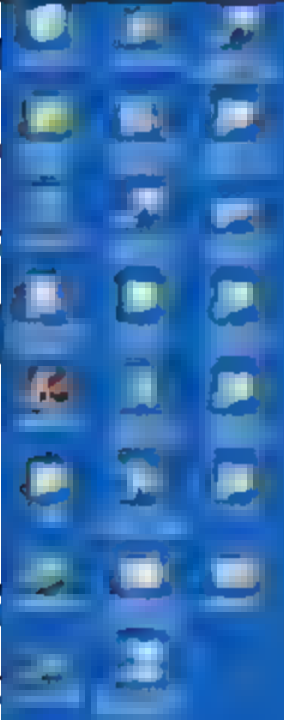
11.15

Figure 4

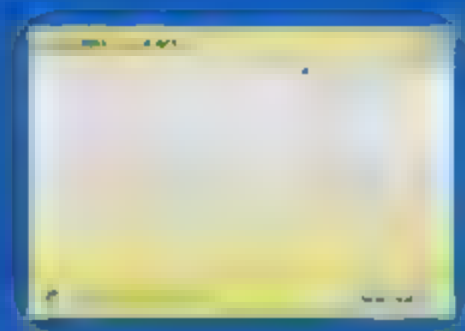
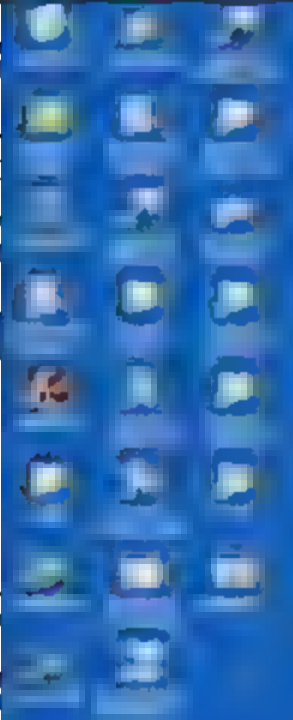
1013

11.16

Figure 5







10. 11. 1911

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## Picture Extraction

1. Open the image in a web browser  
2. Right-click on the image  
3. Select "Save image as..."  
4. Save the image to your computer

1. Open the image in a web browser  
2. Right-click on the image  
3. Select "Save image as..."  
4. Save the image to your computer

I can't do that

Picture Extraction

selected answers

not a "line item"

UNIST 29

1.1

Black and

## "Think with Ink"

1. Write a sentence that describes the problem.

2. Write a sentence that describes the solution.

3. Write a sentence that describes the process.

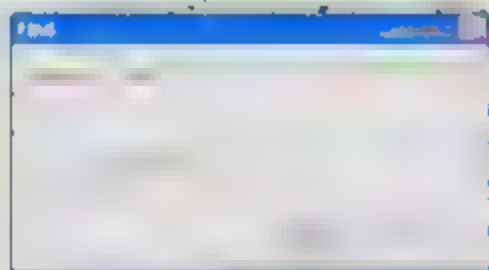
4. Write a sentence that describes the result.

5. Write a sentence that describes the conclusion.

6. Write a sentence that describes the final result.

7. Write a sentence that describes the final result.



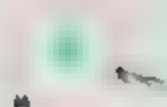


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## "Think with Ink"

1. The first step in the process of thinking is to identify the problem or question that needs to be solved.

2. Next, you need to gather information and resources that will help you understand the problem and find a solution.

3. Once you have gathered information, you need to analyze it and identify the key factors that will influence the solution.

4. After analyzing the information, you need to develop a plan or strategy that will help you solve the problem or answer the question.

5. The next step is to implement the plan or strategy and monitor the results to see if you are making progress towards solving the problem or answering the question.

6. Finally, you need to evaluate the results of your thinking and determine if you have successfully solved the problem or answered the question.

7. The last step is to reflect on the process of thinking and identify any lessons learned that will help you improve your thinking skills in the future.

Handwritten text, possibly a title or introductory sentence.

Handwritten text, possibly a paragraph or list.

Handwritten text, possibly a paragraph or list.

Handwritten text, possibly a concluding sentence or signature.

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Handwritten text in the second paragraph.

Handwritten text in the third paragraph.



Handwritten text at the bottom of the page.



# Applications challenges

- Interface for Connected Components
- Picture Extraction
- Extracting Vector Graphics
- Layout Analysis
- Ink rendering and display
- More...

# Platform Components

- Enable inking and handwriting recognition

- Deliver Tablet PC platform SDK

  - ActiveX controls for inking

  - Addition to Win32 API

  - Enable ISVs to integrate ink as a first-class data type

  - Provide guidelines for Speech integration

  - Provide user experience guidelines for Tablet applications

- Promote pen, ink, speech in Microsoft & ISV applications



# Platform Components

## Software Development Kit (SDK)

### Contents

- WSP header and file files
- SAPI 5.1 SDK
- Tablet PC User Experience guidelines
- Sample code
- Online docs
- Visual Studio 6.0/7.0 project templates
- .NET scenario support and framework integration

### Delivery

- MSDN Integration (MSDN subscription, [msdn.microsoft.com](http://msdn.microsoft.com))
- Windows XP Pro 'plus' with Windows tablets for developers
- Certification programs

# Platform challenges

- **Recognition**

- Handwriting, gestures, speech, etc

- **Interaction between character, ink and speech**

- Recognition

- User interaction

- **More...**

# Handwriting Recognition

- Key focus: Experiments that focus on reducing error rate!
- Primary research on Neural Net, HMM, KNN, and CART algorithms
- Hybrid classifiers (classifier fusion) enable us to make significant reduction in error rate
- Data is King — work with LARGE amounts of data:
  - ex. 16M words in English, 32M Char JPN

# Handwriting Reco cont

## Recent and ongoing problems

- Better fusion and core reco techniques

- Gesture recognition (Bo Thiesson)

- Enrollment of hybrid classifier

- Language Models (collaborate with MSKK)

- Separation of drawings vs. text

- Reduction of training time

## Contacts: JPittman and GregHull

# Tablet Usability

## Where we've been, what we've done

- Early prototype testing of notebook concepts
- Note taking ethnography
- Annotation ethnography
- Multiple iterative test of the M2 notebook implementation
- Multiple iterative tests of the "TIP"
- Plenty of heuristic evaluations
- Field Trials



# Field Trial Methodology

- 21 user case study approach
- 4 full weeks of hands-on Tablet PC usage
- 6 formal interview/observation sessions
  - Prescreening interview
  - Training & scripted task session
  - Meeting observation
  - Scripted task session
  - Meeting observation
  - Final interview and artifact walk through
- 2+ hours of user interaction per week
- Informal drop in sessions when possible

# Field Trial Conclusions

- Too complex and over-engineered
- Writing and editing didn't necessarily co-occur and was not seamless
- Note storage of raw ink seen as valuable
- Situations drive usage more than other PCs
- Docking Station a must
- Network infrastructure play a big role

# Overall Findings

- Intelligent heuristics while powerful confuse and frustrate users when they aren't predictable
- Targeting with a pen can be more difficult than with a mouse
- Hand occludes objects – menus and controls appear under the user's hand
- Screen is kept in whatever orientation last used
- Users have an initial expectation that they can ink anywhere
- Writing for correction/repurposing is different than jotting down information
- Handwriting recognition is highly variable by person

# The "Whole Pie"



# Very Preliminary Milestones

- **June 2001**
  - Design Preview in Redmond
- **Q4 2001**
  - Beta OAK released
  - Fall Comdex
- **Q1 2002**
  - Release candidate
- **Q2-Q4 2002**
  - Final release – US English

*Localized versions released shortly afterwards*

# Design Preview Event

- **June 11th and 12th in Seattle, WA**
  - Bell Harbor International Conference Center
- **Attendees: All early adopter ISVs, OEM/IHV partners**
  - Total attendance ~100 people
  - All attendees under NDA
- **Two presentation tracks – ISVs, OEMs**
  - Tracks mixed so ISVs and OEMs understand each other
- **ISV Track: Building Applications**
  - Educate ISVs on Microsoft Ink components, user experience guidelines and speech integration
  - Educate ISVs on scope of integration work
  - Recommendations for development and schedule
  - Start working with Tablet SDK Alpha
- **OEM Track: Developing Hardware**



# Early Adopter ISVs

- **Segments**

- Desktop Productivity
- Collaboration
- CRM
- ERP
- Enterprise Applications

- **Proprietary Apps**

- Financial Services
- Management Consulting
- Sports

- **Verticals**

- Healthcare
- Legal
- Corporate Training
- Engineering
- Manufacturing
- Publishing/Journalism

- **System Integrators**